Introducing cobalt as a potential plasmonic candidate for combining optical and magnetic functionalities within the same nanostructure.

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Supplementary Information

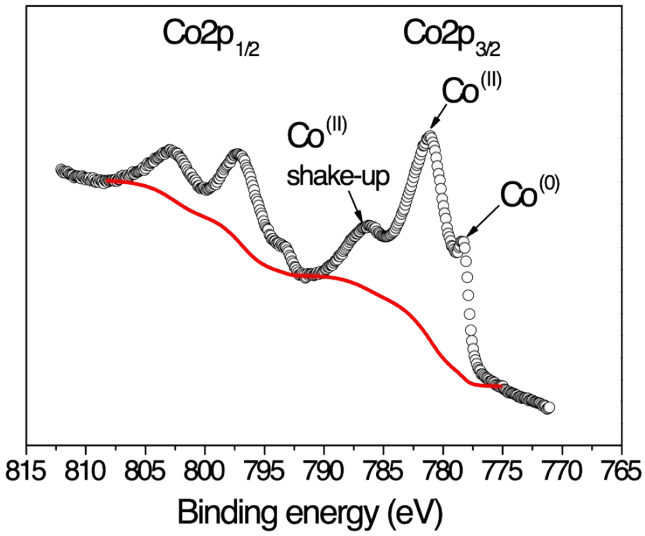


Fig. S1. XPS high resolution Co 2p peak spectrum of a Co film deposited on an ITO-coated glass substrate. The signal is dominated by the Co(II) component which is explained by the presence of a surface native CoO layer of about 4 nm. The underlying Co(0) layer is also evidenced by the characteristic peak at ca. 778 eV.

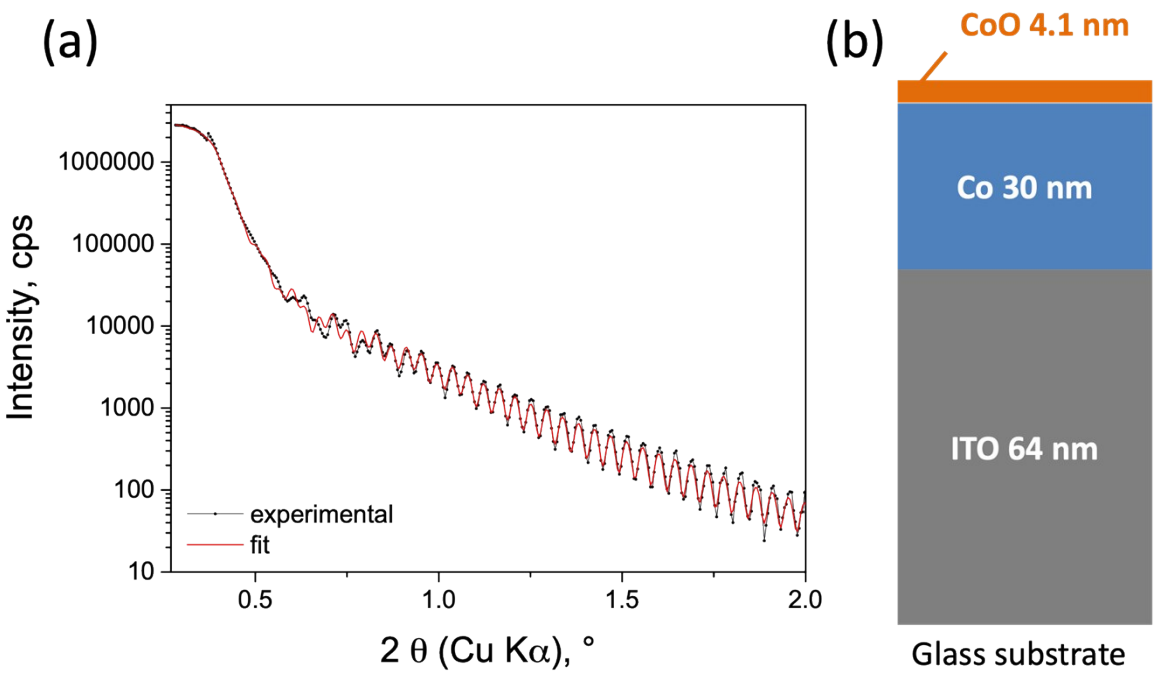


Fig. S2. Analysis of the Co film deposited on an ITO-coated glass substrate by X-ray reflectivity (a) and deduced layer model with the measured thickness (b). The experimental signal was satisfactorily fitted by considering a multi-layer model with an ITO layer of 64 nm, a Co layer of 30 nm and a top CoO layer of about 4 nm.

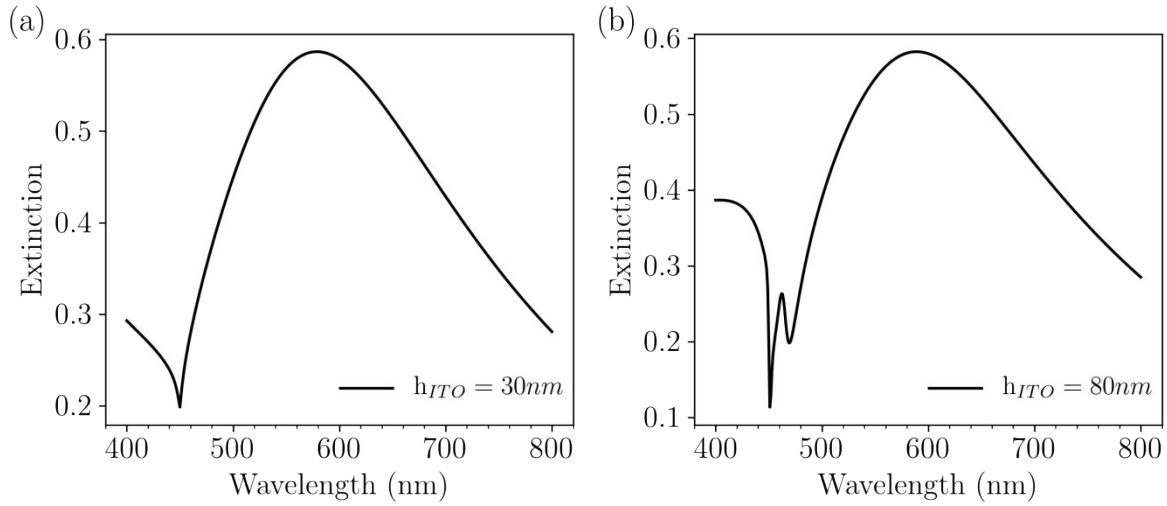
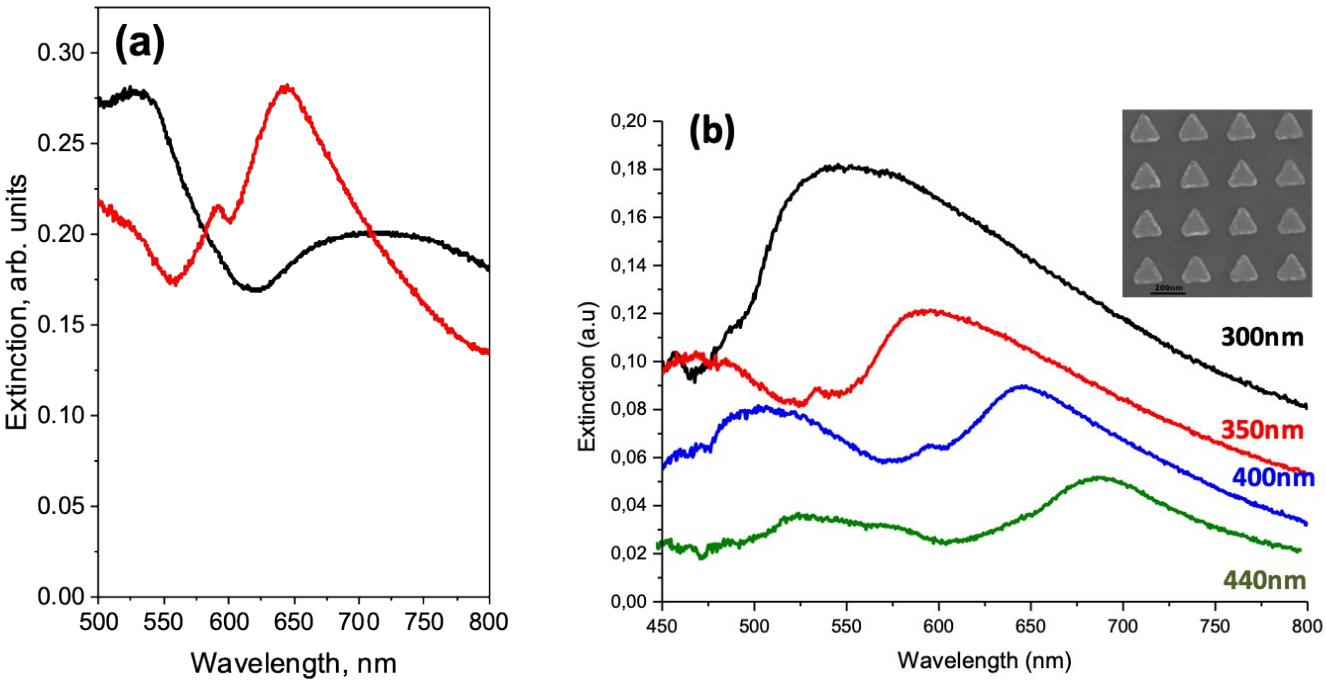


Fig. S3. Calculated extinction spectra of an array of Co NPs for a diameter of D=180 nm, a thickness of 40 nm and a grating constant of 300 nm, for two ITO thicknesses: (a) 30 nm; (b) 80 nm.



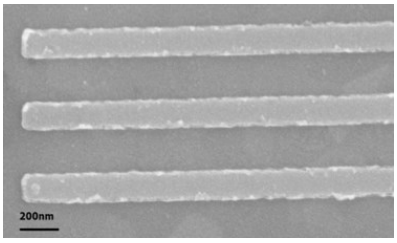


Fig. S4. (a) SEM image of an array of Co stripes (width: 140 nm, height: 40 nm, grating constant: 400 nm) ; extinction spectra with an incident polarization parallel (in black) and perpendicular (in red) to the stripes; (b) SEM image an array of Co triangles (lateral side 180 nm, grating constant: 300 nm, grating constant: 300 nm); Extinction spectra arrays of Co triangles versus the grating constant (from 300 to 440 nm). The LSP band is red-shifted when the grating constant is increasing, following the same behavior than for the arrays of the Co disks.

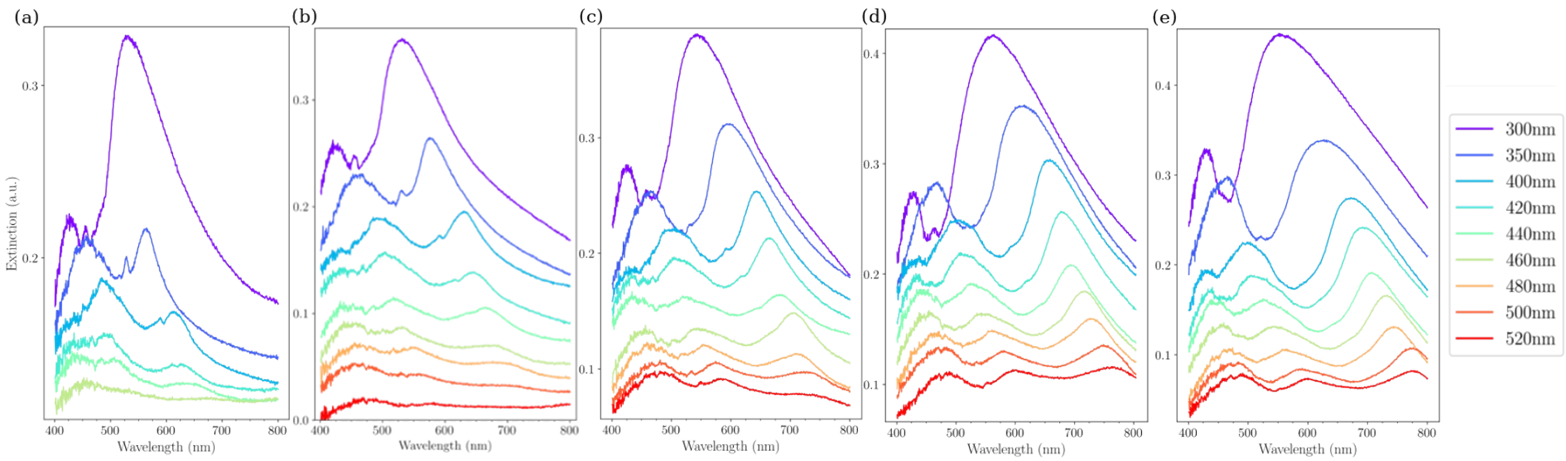

(a)
(b)
(c)
(d)
(e)
Extinction (a.u.)
Wavelength (nm)
300nm
350nm
400nm
420nm
440nm
460nm
480nm
500nm
520nm

Fig. S5. Extinction spectra of arrays of the Co disks distinct diameters: D=120nm (a), 140nm (b), 160nm (c), 180nm (d), and 200nm (e) for various grating constants: from 350 to 520 nm. It is observed that the asymmetry is more pronounced for larger disk diameters, due to significant increase of the imaginary part of the dielectric constant of Co in the visible spectral range.